What we claim is:

1. A method of restarting a permanent magnet turbogenerator/motor, comprising the steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has more than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault; and

continue shutdown of the permanent magnet turbogenerator/motor.

2. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

3. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that more than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

4. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an acceptable connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

5. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has expired; and

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

6. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the grid is acceptable for connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

7. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is below the turn on point of the brake resistor;

determining that the grid is acceptable for connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

8. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the grid is unacceptable for connection;

determining that the maximum allowable reconnection time has expired; and

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

9. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

10. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is below the turn on point of the brake resistor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

11. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a grid connect mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that more than a fixed number of over-current events have occurred within a fixed period of time;

determining that more than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

12. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a standalone mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

13. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a standalone mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that more than a fixed number of over current events have occurred within a fixed period of time;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

resetting the output voltage control ready for a soft start; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

14. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a standalone mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is below the turn on point of the brake resistor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

15. The method of claim 1 wherein the permanent magnet turbogenerator/motor is in a standalone mode and said step of determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down comprises the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

16. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a recharge state where an internal energy storage device is being recharged as part of the shutdown process;

determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

attempt to clear the fault present in the permanent magnet turbogenerator/motor;

issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

continue normal operation of the permanent magnet turbogenerator/motor.

17. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a cooldown state where the turbogenerator/motor is being rotated when combustion has ceased to lower the internal temperature as part of the shutdown process and that the internal temperature is below a cooldown restart temperature;

determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

attempt to clear the fault present in the permanent magnet turbogenerator/motor;

issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

continue normal operation of the permanent magnet turbogenerator/motor.

18. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a fault state;

determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

attempt to clear the fault present in the permanent magnet turbogenerator/motor;

issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

continue normal operation of the permanent magnet turbogenerator/motor.

19. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a standby state;

issue a restart command to the permanent magnet turbogenerator/motor; and

continue normal operation of the permanent magnet turbogenerator/motor.

20. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a recharge state where an internal energy storage device is being recharged as part of the shutdown process;

determining that a fixed period of time has not elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

continue shutdown of the permanent magnet turbogenerator/motor.

21. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a cooldown state where the turbogenerator/motor is being rotated when combustion has ceased to lower the internal temperature as part of the shutdown process and that the internal temperature is below a cooldown restart temperature;

determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

attempt to clear the fault present in the permanent magnet turbogenerator/motor; and

continue shutdown of the permanent magnet turbogenerator/motor when the fault is not cleared.

22. A method of restarting a permanent magnet turbogenerator/motor, comprising them steps of:

determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a fault state;

determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

attempt to clear the fault present in the permanent magnet turbogenerator/motor; and

continue shutdown of the permanent magnet turbogenerator/motor when the fault is not cleared.

23. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

24. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that more than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

25. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an acceptable connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

26. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has expired; and

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

27. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determine that the grid is acceptable for connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

28. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is below the turn on point of the brake resistor;

determine that the grid is acceptable for connection; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

29. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting no output over-current;

detecting a loss of output current control or a loss of DC bus voltage control;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

analyzing the grid voltage magnitude and frequency for an unacceptable connection;

determining that the maximum allowable reconnection time has not expired;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determine that the grid is unacceptable for connection;

determining that the maximum allowable reconnection time has expired; and

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

30. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

31. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is below the turn on point of the brake resistor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

32. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a grid connect mode, comprising the steps of:

detecting an over-current condition;

determining that more than a fixed number of over-current events have occurred within a fixed period of time;

determining that more than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid fatal fault and initiating shutdown of the permanent magnet turbogenerator/motor.

33. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a standalone mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

34. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a standalone mode, comprising the steps of:

detecting an over-current condition;

determining that more than a fixed number of over current events have occurred within a fixed period of time;

determining that less than a fixed number of warning faults has occurred within a fixed period of time;

reporting a grid unbalance warning fault;

disabling the output power converter of the permanent magnet turbogenerator/motor;

resetting the output voltage control ready for a soft start; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

35. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a standalone mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is below the turn on point of the brake resistor;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

36. A method of determining the fault condition of a permanent magnet turbogenerator/motor in a standalone mode, comprising the steps of:

detecting an over-current condition;

determining that less than a fixed number of over-current events have occurred within a fixed period of time;

disabling the output power converter of the permanent magnet turbogenerator/motor;

determining that the output current of the permanent magnet turbogenerator/motor is not at a normal level in all phases;

determining that the DC bus level is not below the turn on point of the brake resistor;

applying the brake resistor to control DC bus voltage;

determining that the output current of the permanent magnet turbogenerator/motor is at a normal level in all phases; and

enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.

37. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has more than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault; and

means to continue shutdown of the permanent magnet turbogenerator/motor.

38. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a recharge state where an internal energy storage device is being recharged as part of the shutdown process;

means for determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to attempt to clear the fault present in the permanent magnet turbogenerator/motor;

means to issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

means to continue normal operation of the permanent magnet turbogenerator/motor.

39. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

means for determining that the permanent magnet turbogenerator/motor is in a cooldown state where the turbogenerator/motor is being rotated when combustion has ceased to lower the internal temperature as part of the shutdown process and that the internal temperature is below a cooldown restart temperature;

means for determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to attempt to clear the fault present in the permanent magnet turbogenerator/motor;

means to issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

means to continue normal operation of the permanent magnet turbogenerator/motor.

40. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

means for determining that the permanent magnet turbogenerator/motor is in a fault state;

means for determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to attempt to clear the fault present in the permanent magnet turbogenerator/motor;

means to issue a restart command to the permanent magnet turbogenerator/motor if the fatal fault is successfully cleared; and

means to continue normal operation of the permanent magnet turbogenerator/motor.

41. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

means for determining that the permanent magnet turbogenerator/motor is in a standby state;

means to issue a restart command to the permanent magnet turbogenerator/motor; and

means to continue normal operation of the permanent magnet turbogenerator/motor.

42. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

determining that the permanent magnet turbogenerator/motor is in a recharge state where an internal energy storage device is being recharged as part of the shutdown process;

means for determining that a fixed period of time has not elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to continue shutdown of the permanent magnet turbogenerator/motor.

43. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

means for determining that the permanent magnet turbogenerator/motor is in a cooldown state where the turbogenerator/motor is being rotated when combustion has ceased to lower the internal temperature as part of the shutdown process and that the internal temperature is below a cooldown restart temperature;

means for determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to attempt to clear the fault present in the permanent magnet turbogenerator/motor; and

means to continue shutdown of the permanent magnet turbogenerator/motor when the fault is not cleared.

44. A permanent magnet turbogenerator/motor restarting system, comprising:

means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down;

means for determining that the permanent magnet turbogenerator/motor has less than a fixed number of restart attempts since the permanent magnet turbogenerator/motor was determined to have a fatal fault;

means for determining that the permanent magnet turbogenerator/motor is in a fault state;

means for determining that a fixed period of time has elapsed since any previous attempt to restart the permanent magnet turbogenerator/motor;

means to attempt to clear the fault present in the permanent magnet turbogenerator/motor; and

means to continue shutdown of the permanent magnet turbogenerator/motor when the fault is not cleared.

45. The permanent magnet turbogenerator/motor restarting system of claim 44 wherein said means for determining that the permanent magnet turbogenerator/motor has a fatal fault present and is in the process of shutting down, comprises:

means for detecting no output over-current;

means for detecting a loss of output current control or a loss of DC bus voltage control;

means for determining that less than a fixed number of warning faults has occurred within a fixed period of time;

means for reporting a grid unbalance warning fault;

means for disabling the output power converter of the permanent magnet turbogenerator/motor;

means for analyzing the grid voltage magnitude and frequency for an unacceptable connection;

means for determining that the maximum allowable reconnection time has not expired;

means for determining that the DC bus level is not below the turn on point of the brake resistor;

means for applying the brake resistor to control DC bus voltage;

means for determining that the grid is acceptable for connection; and

means for enabling the output power converter of the permanent magnet turbogenerator/motor to continue normal operation of the permanent magnet turbogenerator/motor.